POLITECNICO DI MILANO

PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 38th cycle

INTERDISCIPLINARY Research Field: DESIGNING THE SUPPLY CHAINS OF THE FUTURE: SCALING-UP THE USE OF NEW SUSTAINABLE MATERIALS IN THE CONSTRUCTION INDUSTRY

Monthly net income of PhDscholarship (max 36 months)
€ 1400.0 In case of a change of the welfare rates or of changes of the scholarship minimum amount from the Ministry of University and Reasearch, during the three-year period, the amount could be modified.

Context of the research activity	
Motivation and objectives of the research in this field	Interdisciplinary PhD Grant The PhD research will be carried out in collaboration with research groups of the PhD programme in "**ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING**". See https://www.dottorato.polimi.it/?id=422&L=1 for further information. Construction is an industry with big impact on the environment and on society. From an environmental perspective, material research has generated, during the last years, innovative and promising materials that can allow sustainable buildings, thus supporting smart cities. Among others **¿**Bio-based materials**¿,** i.e. materials delivered by living organisms, e.g. as fungi or plants, seem promising in their use in buildings. They have good properties in terms of insulation, soundproofing, and environmental impact. These materials are less polluting in production and disposal. In spite of consumers¿ interest in these materials, as well as the fact that there are companies already selling these products, there are still hurdles to mass production and use of these materials. For instance, resistance to innovation, absence of scalable business models, the need to design new supply chains, and the need of performing intensive testing activities, permissions from governmental institutions, and standardization efforts, are among the

	reasons why these materials are not produced and used at mass scale. To address the above-mentioned problems, this research project aims to answer the following main research questions: • What are the requirements on innovative materials that fit best our future living and working? And what are the potential (bio-based) materials that satisfy these requirements? • What innovative business models and supply chains can best leverage bio-based materials in construction? • What are the drivers and barriers to accommodate the bio-based material in the construction industry?
Methods and techniques that will be developed and used to carry out the research	To provide an answer to the research questions, the following methodologies are adequate: - Focus groups/industry workshops involving bio-based materials researchers and supply chain experts to identify the requirements on bio-based materials - Expert interviews for the investigation of potential barriers to sustainable innovation in construction and for the identification of possible solutions to overcome these barriers, while taking technical, supply chain and business models perspectives - Conceptual development of methods and tools for supply chain and business model innovation to accommodate bio-based materials in construction - Case studies/action research to apply and improve the proposed methods
Educational objectives	The Ph.D. candidate at the end of the program will possess adequate research skills in the field of supply chain management and a specific knowledge of innovative materials for the construction industry. In particular, the Ph.D, candidate will: - be able to perform a structured literature review - be able to perform qualitative research methods - be able to analyse qualitative data to develop insights and methods/tools - be able to present and publish her/his research results

Job opportunities	Academia, international institutions, construction companies, multinational organizations, consulting firms.
Composition of the research group	0 Full Professors 3 Associated Professors 0 Assistant Professors 2 PhD Students
Name of the research directors	Margherita Pero, Nizar Abdelkafi, Ingrid Paoletti

Contacts
Margherita.pero@polimi.it; Nizar.abdelkafi@polimi.it

Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
Candidates with a background in Management Engineering, Mechanical Engineering, Built Environment Engineering, Supply Chain Management Studies, Architecture. The candidate might be involved as research associate in additional research projects and as teaching assistant in courses in the area of Operations and Supply Chain Management. A desk will be provided in the Department of Management, Economics and Industrial Engineering. *Funding for educational activities: 5.700,00 Euros for three years.* *Teaching assistantship: There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.* *Desk availability: shared use* *Computer availability: individual use*